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Harvard College, diff. of magnitude		2·14
Oxford	,,	1·74
Oxford repeated (Nov. 6)	,,	1·82

Having reason to place great reliance on Professor Pickering's photometry, I directed the re-observation of the stars. The result (given above) confirmed the Oxford measure, and nothing remained for me but to agree to differ from the Harvard result. I think the trifling discrepancy, for after all it is but trifling, admits now of a very satisfactory explanation. The Harvard photometer is on the principle of applying the judgment of the eye to the equality of light; the Oxford method relies on the judgment of the eye as to the point of extinction of a light. Each is valuable in its way, but as at present advised (and with special reference to the experiment just mentioned) I am inclined to place a greater reliance on the latter method in the case of photometry of double stars of *different* colours.

I will close this note by stating that the photometry of the brighter stars from the Pole to the Equator is now completed, and that before the reading of this note to the Society I shall be on my way to Cairo for the purpose of instituting some inquiries respecting the atmospheric and climatic effects on the absolute brilliancy of stars, which appear to me to be essential to the completion of this photometric research.

Reduction of Latitude and Logarithm of the Earth's Radius with Col. Clarke's Value of the Earth's Compression. By E. J. Stone, M.A., F.R.S.

The semi-diameters of the spheroid, which best represents the Earth's surface, determined by Col. Clarke, differ considerably from those found by Airy and Bessel.

The following are the results for the Equatorial and Polar semi-diameters expressed in English feet:—

		a	b	a : b
Airy	...	20923713	20853810	299·33 : 298·33
Bessel	...	20923600	20853656	299·15 : 298·15
Clarke	...	20926202	20854895	293·465 : 292·465

The two first results agree in a very remarkable manner; but to a great extent they were deduced from a discussion of the same data.

A large mass of observations, bearing on the question of the figure of the Earth, have recently been made available, and Col. Clarke has attacked the question with far more extensive materials than were available to Airy or Bessel in their discussions. I presume therefore we must accept Col. Clarke's

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results as more accurate than those of Airy and Bessel, and that Col. Clarke's value of the ratio $a : b$ ought to be adopted for use in our calculations.

I have therefore formed a table, with Col. Clarke's value of the ratio $a : b$, of the *reductions* from the astronomical or geographical latitudes to the geocentric latitude, and also the *logarithms* of the ratios of the radii to the equatorial semi-diameter.

The formulæ from which the computations have been made are as follows:—

$$e^2 = 1 - \frac{b^2}{a^2} \qquad \epsilon = \frac{e^2}{2} + \left(\frac{e^2}{2}\right)^2 + \left(\frac{e^2}{2}\right)^3. \qquad \text{M} = \text{mantissa of base 10.}$$

ϕ, ϕ' the astronomical and geocentric latitudes.

$$\phi' = \phi - \frac{\epsilon . \sin 2\phi}{\sin 1''} + \frac{\epsilon^2}{2} . \frac{\sin 4\phi}{\sin 1''} - \frac{\epsilon^3}{3} . \frac{\sin 6\phi}{\sin 1''},$$

$$\log \frac{r}{a} = \text{M} \left\{ \left(-\frac{e^2}{4} - \frac{e^4}{32} + \frac{e^6}{96} \right) + \cos 2\phi \left(+ \frac{e^2}{4} + \frac{e^4}{8} + \frac{3}{64} e^6 \right) + \cos 4\phi \left(-\frac{3}{32} e^4 - \frac{3}{32} e^6 \right) + \cos 6 \left(\frac{7}{2} e^6 \right) \right\}$$

The terms sin 6ϕ and cos 6ϕ are insensible to the order of approximation adopted.

ϕ	$\phi - \phi'$	Diff.	log. ρ	Diff.
° ′	′ ″	″		
0 0	0 0·00	24·49	0·0000000	3
1 0	0 24·49	24·46	9·9999997	14
2 0	0 48·95	24·39	9983	22
3 0	1 13·34	24·31	9961	31
4 0	1 37·65	24·20	9930	40
5 0	2 1·85	24·04	9890	49
6 0	2 25·89	23·87	9·9999841	58
7 0	2 49·76	23·67	9783	66
8 0	3 13·43	23·43	9717	75
9 0	3 36·86	23·17	9642	83
10 0	4 0·03	22·88	9559	92
11 0	4 22·91	22·56.	9467	100
12 0	4 45·47	22·22	9·9999367	109
13 0	5 7·69	21·85	9258	116
14 0	5 29·54	21·45	9142	124
15 0	5 50·99	21·02	9018	133
16 0	6 12·01	20·58	8885	139
17 0	6 32·59	20·10	8746	147

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ϕ	$\phi-\phi'$	Diff.	log. ρ	Diff.
° ′	′ ″	″		
18 0	6 52·69	19·60	9·9998599	155
19 0	7 12·29	19·08	8444	161
20 0	7 31·37	18·54	8283	169
21 0	7 49·91	17·97	8114	175
22 0	8 7·88	17·37	7939	182
23 0	8 25·25	16·77	7757	187
24 0	8 42·02	16·13	9·9997570	194
25 0	8 58·15	15·49	7376	200
26 0	9 13·64	14·81	7176	206
27 0	9 28·45	14·12	6970	210
28 0	9 42·57	13·42	6760	216
29 0	9 55·99	12·70	6544	221
30 0	10 8·69	2·04	9·9996323	37
10	10·73	2·03	6286	37
20	12·76	2·00	6249	38
30	14·76	1·98	6211	37
40	16·74	1·97	6174	38
50	18·71	1·94	6136	38
31 0	10 20·65	1·92	9·9996098	38
10	22·57	1·90	6060	38
20	24·47	1·88	6022	38
30	26·35	1·85	5984	38
40	28·20	1·84	5946	39
50	30·04	1·81	5907	38
32 0	10 31·85	1·80	9·9995869	39
10	33·65	1·77	5830	39
20	35·42	1·75	5791	39
30	37·17	1·73	5752	38
40	38·90	1·71	5714	39
50	40·61	1·68	5675	
33 0	10 42·29	1·67	9·9995635	39
10	43·96	1·64	5596	39
20	45·60	1·62	5557	40
30	47·22	1·60	5517	39
40	48·82	1·58	5478	40
50	50·40	1·55	5438	40

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φ	φ—φ′	Diff.	log. ρ	Diff.
° ′	′ ″	″		
34 0	10 51·95	1·54	9·9995398	40
10	53·49	1·51	5358	40
20	55·00	1·49	5318	40
30	56·49	1·46	5278	40
40	57·95	1·45	5238	40
50	59·40	1·42	5198	41
35 0	11 0·82	1·40	9·9995157	40
10	2·22	1·38	5117	41
20	3·60	1·36	5076	40
30	4·96	1·33	5036	41
40	6·29	1·31	4995	41
50	7·60	1·29	4954	40
36 0	11 8·89	1·27	9·9994914	41
10	10·16	1·24	4873	41
20	11·40	1·22	4832	41
30	12·62	1·20	4791	41
40	13·82	1·17	4750	42
50	14·99	1·15	4708	41
37 0	11 16·14	1·13	9·9994667	41
10	17·27	1·11	4626	42
20	18·38	1·08	4584	41
30	19·46	1·06	4543	42
40	20·52	1·04	4501	42
50	21·56	1·02	4459	41
38 0	11 22·58	0·99	9·9994418	42
10	23·57	·97	4376	42
20	24·54	·94	4334	42
30	25·48	·93	4292	42
40	26·41	·90	4250	42
50	27·31	·87	4208	42
39 0	11 28·18	0·85	9·9994166	42
10	29·03	·83	4124	42
20	29·86	·81	4082	42
30	30·67	·78	4040	43
40	31·45	·76	3997	42
50	32·21	·74	3955	42

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ϕ		$\phi-\phi'$		Diff.	log. ρ	Diff.
°	′	′	″	″		
40	0	11	32·95	0·71	9·9993913	43
	10		33·66	·69	3870	42
	20		34·35	·67	3828	43
	30		35·02	·64	3785	42
	40		35·66	·62	3743	43
	50		36·28	·59	3700	42
41	0	11	36·87	0·57	9·9993658	43
	10		37·44	·55	3615	43
	20		37·99	·53	3527	42
	30		38·52	·50	3530	43
	40		39·02	·47	3487	43
	50		39·49	·46	3444	43
42	0	11	39·95	0·43	9·9993401	43
	10		40·38	·40	3358	43
	20		40·78	·39	3315	42
	30		41·17	·36	3273	43
	40		41·53	·33	3230	43
	50		41·86	·31	3187	43
43	0	11	42·17	0·29	9·9993144	43
	10		42·46	·26	3101	43
	20		42·72	·24	3058	43
	30		42·96	·22	3015	43
	40		43·18	·19	2972	43
	50		43·37	·17	2929	44
44	0	11	43 54	0·15	9·9992885	43
	10		43·69	·12	2842	43
	20		43·81	·10	2799	43
	30		43·91	·07	2756	43
	40		43·98	·05	2713	43
	50		44·03	·02	2670	43
45	0	11	44·05	0·01	9·9992627	43
	10		44·06	·03	2584	43
	20		44·03	·04	2541	44
	30		43·99	·07	2497	43
	40		43·92	·09	2454	43
	50		43·83	·12	2411	43

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φ	φ−φ′	Diff.	log. ρ	Diff.
° ′	′ ″	″		
46 0	11 43·71	0·14	9·9992368	43
10	43·57	·17	2325	43
20	43·40	·18	2282	43
30	43·22	·22	2239	43
40	43·00	·23	2196	43
50	42·77	·26	2153	43
47 0	11 42·51	0·29	9·9992110	43
10	42·22	·30	2067	43
20	41·92	·34	2024	43
30	41·58	·35	1981	43
40	41·23	·38	1938	43
50	40·85	·40	1895	43
48 0	11 40·45	0·43	9·9991852	43
10	40·02	·45	1809	43
20	39·57	·47	1766	43
30	39·10	·50	1723	43
40	38·60	·52	1680	43
50	38·08	·55	1637	43
49 0	11 37·53	0·56	9·9991594	42
10	36·97	·60	1552	43
20	36·37	·61	1509	43
30	35·76	·64	1466	42
40	35·12	·66	1424	43
50	34·46	·69	1381	42
50 0	11 33·77	0·71	9·9991339	43
10	33·06	·73	1296	42
20	32·33	·76	1254	43
30	31·57	·78	1211	42
40	30·79	·80	1169	43
50	29·99	·83	1126	42
51 0	11 29·16	0·85	9·9991084	42
10	28·31	·88	1042	42
20	27·43	·89	1000	42
30	26·54	·92	0958	42
40	25·62	·95	0916	42
50	24·67	·96	0874	42

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φ	φ−φ′	Diff.	log. ρ	Diff.
° ′	′ ″	″		
52 0	11 23·71	1·00	9·9990832	42
10	22·71	1·01	0790	42
20	21·70	1·03	0748	42
30	20·67	1·06	0706	42
40	19·61	1·09	0664	41
50	18·52	1·10	0623	42
53 0	11 17·42	1·13	9·9990581	42
10	16·29	1·15	0539	41
20	15·14	1·18	0498	42
30	13·96	1·20	0456	41
40	12·76	1·21	0415	41
50	11·55	1·25	0374	41
54 0	11 10·30	1·26	9·9990333	41
10	9·04	1·29	0292	41
20	7·75	1·31	0251	41
30	6·44	1·34	0210	41
40	5·10	1·35	0169	41
50	3·75	1·38	0128	41
55 0	11 2·37	1·40	9·9990087	40
10	11 0·97	1·43	0047	41
20	10 59·54	1·44	0006	40
30	58·10	1·47	9·9989966	41
40	56·63	1·49	9925	40
50	55·14	1·52	9885	40
56 0	10 53·62	1·53	9·9989845	40
10	52·09	1·56	9805	40
20	50·53	1·58	9765	40
30	48·95	1·60	9725	40
40	47·35	1·63	9685	40
50	45·72	1·64	9645	39
57 0	10 44·08	1·67	9·9989606	40
10	42·41	1·69	9566	39
20	40·72	1·71	9527	39
30	39·01	1·73	9488	40
40	37·28	1·76	9448	39
50	35·52	1·77	9409	39

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φ	φ−φ′	Diff.	log. ρ	Diff.
° ′	′ ″	″		
58 0	10 33·75	1·80	9·9989370	39
10	31·95	1·82	9331	38
20	30·13	1·84	9293	39
30	28·29	1·86	9254	38
40	26·43	1·89	9216	39
50	24·54	1·90	9177	38
59 0	10 22·64	1·93	9·9989139	38
10	20·71	1·95	9101	38
20	18·76	1·96	9063	38
30	16·80	1·99	9025	38
40	14·81	2·01	8987	38
50	12·80	2·03	8949	38
60 0	10 10·77	12·62	9·9988911	223
61 0	9 58·15	13·35	8688	218
62 0	9 44·80	14·06	8470	213
63 0	9 30·74	14·77	8257	208
64 0	9 15·97	15·45	8049	202
65 0	9 0·52	16·11	7847	197
66 0	8 44·41	16·76	9·9987650	190
67 0	8 27·65	17·37	7460	184
68 0	8 10·28	17·98	7276	178
69 0	7 52·30	18·56	7098	171
70 0	7 33·74	19·11	6927	164
71 0	7 14·63	19·65	6763	157
72 0	6 54·98	20·16	9·9986606	150
73 0	6 34·82	20·65	6456	142
74 0	6 14·17	21·10	6314	134
75 0	5 53·07	21·54	6180	127
76 0	5 31·53	21·95	6053	119
77 0	5 9·58	22·32	5934	110
78 0	4 47·26	22·68	9·9985824	102
79 0	4 24·58	23·01	5722	93
80 0	4 1·57	23·30	5629	86
81 0	3 38·27	23·57	5543	76
82 0	3 14·70	23·81	5467	68
83 0	2 50·89	24·02	5399	58

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φ	φ−φ′	Diff.	log. ρ	Diff.
° ′	′ ″	″		
84 0	2 26·87	24·20	9·9985341	50
85 0	2 2·67	24·35	5291	41
86 0	1 38·32	24·48	5250	32
87 0	1 13·84	24·56	5218	23
88 0	0 49·28	24·62	5195	13
89 0	0 24·66	24·66	5182	5
90 0	0 0·00		5177	

Meteors and Meteorology. By Richard A Proctor.

It will be in the knowledge of most of the Fellows of this Society that Erman long since maintained a meteoric theory in explanation of the so-called "cold days" which occur in February, April, and May. He believed that the cold which on the average of a great number of years is found to characterise those days is due to the existence of meteoric streams between the Earth and the Sun. He even held that the cold of February is due to the August meteor system, whose ascending node would have about the same heliocentric longitude as the Earth has at the middle of the February cold spell; while in like manner he associated the cold days of May with the November meteors. We now know that this part of his theory is mistaken. The ascending nodes of those two important meteor systems lie in the right heliocentric longitude; but, unfortunately for the theory, both meteor systems cross the plane of the ecliptic ascendingly far outside the Earth's orbit, so that she may throw her shadow on the meteors of those systems, but cannot possibly be shadowed by them.

I have been in the habit of regarding Erman's theory as probably erroneous altogether, though noting that it would have to be accepted if any evidence were obtained showing the whole Earth, and not Europe only, to undergo these periodical refrigerations. Mr. Russell, Government Observer at Sydney, has recently published evidence which seems to go a great way towards proving that this really is the case. In Australia and in America, it would seem, the average temperature of the cold days is lower than it should be if the seasonal rise from January to July were steadily maintained. He also quotes evidence obtained in Galileo's time, which shows that the same peculiarity was recognised in Europe more than two centuries and a half ago. That sometimes the fall of temperature must have been very marked is shown by the existence of popular proverbial expressions, doggerel verses, and so forth, in reference to these cold spells.

It seems to me, then, that we must revert to the meteoric theory, recognising in the existence of meteoric systems between